

What is claimed is:

1. A method for sensing specific molecules, the method comprising:
forming a nanoelement structure; and
forming two spaced apart electrodes in contact with the nanoelement structure, wherein at least one of the electrodes is capable of functioning as a sensing element to sense the specific molecules.
2. The method of claim 1, further comprising coating the electrode with a material to enhance the sensitivity of the electrode to the specific molecules.
3. The method of claim 1, wherein the nanoelement structure comprises elements selected from the group consisting of a hollow nanotube and a solid nanowire.
4. A method for sensing specific molecules, the method comprising:
forming a nanoelement structure;
forming two electrodes in contact with the nanoelement structure; and
treating at least one of the two electrodes with a material to enable the electrode to function as a sensor for the specific molecules
5. The method of claim 4, wherein at least one of the two electrodes comprises a material selected from the group consisting of Pd, PdNi, Au, and AuPd.

6. The method of claim 4, wherein the nanoelement structure comprises elements selected from the group consisting of a hollow nanotube, and a solid nanowire.
7. A device for sensing specific molecules, the device comprising:
a nanostructure; and
two electrodes connected by the nanostructure, wherein at least one electrode and a junction between the electrode and the nanostructure defines a sensing element for the specific molecules.
8. The device of claim 7, wherein the nanostructure comprises at least one nanoelement selected from the group consisting of a hollow nanotube and a solid nanowire.
9. The device of claim 8, wherein the nanostructure comprises a carbon nanotube.
10. The device of claim 7, wherein at least one electrode that defines the sensing element is coated with a material to sensitize the electrode to the specific molecules.
11. The device of claim 7, wherein the material comprises palladium.
12. The device of claim 11, wherein the specific molecules comprise H₂ molecules.

13. The device of claim 11, wherein the device is for sensing at least one hydride gas.
14. The device of claim 11, wherein the operating temperature for the device is from room temperature to 120°C.
15. The device of claim 7, wherein at least one of the electrodes comprises gold.
16. The device of claim 15, wherein the specific molecules comprise H₂S molecules.
17. The device of claim 15, wherein the operating temperature for the device is from room temperature to 250°C.
18. The device of claim 7, wherein at least one of the two electrode comprises palladium and gold.
19. The device of claim 16, wherein the specific molecules comprise bio-molecules.
20. The device of claim 16, wherein the specific molecules comprise streptavidin molecules.
21. The device of claim 18, wherein at least one of the two electrodes is immobilized with a chemical that comprises biotin.

22. The device of claim 21, wherein the specific molecules comprise streptavidin molecules.
23. A device for sensing fluids, the device comprising:
at least one nanoelement;
a first electrode and a second electrode connected by the at least one nanoelement;
a third gate electrode disposed between the first and second electrode, wherein at least one of the first and second electrodes and a junction between the electrode and the at least one nanoelement defines a sensing element for the specific molecules; and
wherein a gate voltage applied to the third gate electrode changes the Schottky barrier at the junction.
24. The device of claim 23, wherein the nanoelement is selected from the group consisting of a hollow nanotube and a solid nanowire.
25. The device of claim 23, wherein the nanoelement comprises a carbon nanotube.
26. The device of claim 23, wherein at least one of the first and second electrodes comprises palladium.
27. The device of claim 26, wherein the specific molecules comprise H₂ molecules.

28. The device of claim 26, wherein the specific molecules comprise at least one hydride gas molecule.
29. The device of claim 23, wherein at least one of the first and second electrodes comprises gold.
30. The device of claim 29, wherein the specific molecules comprise H₂S molecules.
31. The device of claim 29, wherein the specific molecules comprise a bio-molecule.
32. The device of claim 23, wherein the third gate electrode comprises silicon.
33. The device of claim 23, wherein the third gate electrode comprises a metal.
34. The device of claim 23, wherein at least one of the first and second electrodes comprises palladium and gold.
35. The device of claim 34, wherein the specific molecules comprise a bio-molecule.
36. The device of claim 34, wherein the specific molecules comprise streptavidin molecules.
37. The device of claim 34, wherein at least one of the first and second

electrodes is immobilized with a chemical that comprises biotin.

38. The device of claim 37, wherein the specific molecules comprise streptavidin molecules.

39. A field-effect transistor device, comprising:
at least one nanoelement; and
a first and a second electrode connected by the or each nanoelement,
wherein at least one of the first and second electrodes includes palladium.

40. The transistor device of claim 39, wherein the electrode that includes palladium includes an alloy of palladium.